

Claims

We claim:

1. A system for treating a fluid comprising:
a treatment chamber;
a light source for emitting light, such that at least a portion of the light travels within the treatment chamber; and
a treatment area within the treatment chamber;
wherein a flow profile of the fluid in the treatment area matches the fluence profile of the light that travels within the treatment area.
2. The system of claim 1 wherein the light source is a broad spectrum pulsed light source.
3. The system of claim 1 wherein the light source produces at least one wavelength of light between 170nm and 2600nm.
4. The system of claim 1 wherein the light source is a continuous wave light source.
5. The system of claim 1 wherein the light source is a mercury gas lamp.
6. The system of claim 1 wherein the light source is a pulsed laser.
7. The system of claim 1 wherein the light source is internal to the treatment chamber.

8. The system of claim 1 wherein the light source is external to the treatment chamber.

9. The system of claim 1 further comprising a plurality of baffles coupled to the treatment chamber, wherein the baffles control the flow of fluid within the treatment chamber.

10. The system of claim 9 wherein the plurality of baffles provide for substantially uniform treatment of the fluid.

11. A system for the treatment of fluid comprising:
a treatment chamber;
a light source for emitting light, such that at least a portion of the light travels within the treatment chamber; and
a plurality of transmissive baffles for controlling the flow of fluid within the treatment chamber;
wherein the transmissive baffles allow transmission of the light throughout the treatment chamber preventing biofilm buildup within the treatment chamber.

12. The system of claim 11 wherein the light source is a broad spectrum pulsed light source.

13. The system of claim 11 wherein the light source produces at least one wavelength of light between 170nm and 2600nm.

14. The system of claim 11 wherein the light source is a continuous wave light source.

15. The system of claim 11 wherein the light source is a mercury gas lamp.

16. The system of claim 11 wherein the light source is a pulsed laser.

17. The system of claim 1 wherein the light source is internal to the treatment chamber.

18. The system of claim 11 wherein the light source is external to the treatment chamber.

19. The system of claim 11 wherein the plurality of baffles match the flow of fluid to the fluence profile of the light source in at least a portion of the treatment chamber.

20. An apparatus for treating a liquid with light comprising:
a treatment chamber;
a first baffle within the treatment chamber for slowing the velocity of the fluid;
a second baffle within the treatment chamber for matching the flow of the fluid a fluence profile of light traveling within at least a portion of the treatment chamber; and
a third baffle within the treatment chamber for maintaining the flow of the fluid throughout a treatment area.

21. The apparatus of claim 20 wherein at least a part of the light source is within the treatment chamber.

22. The apparatus of claim 20 wherein the light source is outside the treatment chamber.

23. A method of treating a fluid comprising:
inputting the fluid into a treatment chamber;
exposing the fluid to light from the treatment lamp;
matching a flow profile of the fluid with a fluence pattern of a light source within at least a portion of the treatment chamber; and
outputting the fluid from the treatment chamber.

24. The method of claim 23 further comprising the steps of:
providing a first baffle within the treatment chamber designed to slow the fluid velocity;
providing a second baffle within the treatment chamber designed to distribute the flow of the fluid; and
providing a third baffle within the treatment chamber designed to maintain the flow of the fluid through a treatment area.

25. A method of treating fluid comprising:
inputting a fluid into a treatment chamber;
matching a flow profile of the fluid with a fluence pattern of a treatment lamp; and
outputting the fluid from the treatment chamber.

26. The system of claim 25 wherein the treatment lamp produces a broad spectrum pulsed light.

27. The system of claim 25 wherein the treatment lamp produces at least one wavelength of light between 170nm and 2600nm.

28. The system of claim 25 wherein the treatment lamp produces a continuous wave light.

29. The system of claim 25 wherein the treatment lamp is a mercury gas lamp.

30. The system of claim 25 wherein the treatment lamp is a pulsed laser.

31. The system of claim 25 wherein the treatment lamp is internal to the treatment chamber.

32. The system of claim 25 wherein the treatment lamp is external to the treatment chamber.